Current Claims Schedule

1. (Original) Apparatus for performing a transesophageal cardiovascular procedure, said apparatus comprising

an elongated tubular main access device having a first lumen with an open proximal end and a distal side opening;

inflatable sealing means on the outside of said device above and below said side opening, and

a first fluid conduit extending along said device for inflating said sealing means so that when the device is inserted into a patient's esophagus and the sealing means are inflated, the portion of the esophagus opposite said side opening is isolated from the remainder of the esophagus above and below the side opening.

2. (Original) The apparatus defined in claim 1 and further including

a second fluid conduit extending along said device, said second conduit having a proximal end for connection to a vacuum source and a distal end which opens adjacent to said side opening so that fluid may be sucked from the isolated portion of the esophagus.

3. (Original) The apparatus defined in claim 1

wherein said device has a second lumen with a rigid outer wall and a collapsible inner wall, said second lumen adapted to receive an elongated probe or surgical device, and

further including means for introducing a fluid between said inner and outer walls to collapse the inner wall against the probe or surgical device.

4. (Original) The apparatus defined in claim 1 and further including

perforate fluid channels formed in the outside of said device above and below said side opening, and

means extending along the device for conducting fluid to and/or from said channels.

5. (Original) The apparatus defined in claim 1 and further including a side access unit comprising

elongated flexible coaxial inner and outer tubes said tubes having proximal and distal ends and being moveable relatively in the axial direction and said inner tube having at least one lumen extending between said ends;

second sealing means mounted to the distal end of the outer tube;

third sealing means mounted to the distal end of the inner tube, and

means adjacent to the proximal ends of said tubes for moving said tubes relatively so as to vary the axial spacing of said second and third said sealing means.

6. (Original) The apparatus defined in claim 5 wherein the second and third sealing means comprise balloons or flanges.

7. (Original) The apparatus defined in claim 5 wherein the second sealing means comprise

a plurality of flexible, axially extending flaps mounted to the distal end of the outer tube, said flaps being movable between a collapsed position wherein the flaps are nested against the outer tube and an extended position wherein the flaps project radially out from the other tube, and

means for moving the flaps between said collapsed and extended positions.

8. (Original) The apparatus defined in claim 7 wherein the moving means comprise

elongated needles extending from the proximal end of the outer tube into said flaps, the segments of said needles in said flaps being curved so that rotation of said needles about their respective axes moves the flaps between said collapsed and extended positions, and

means at said proximal end of the inner tube for rotating said needles about their respective axes.

9. (Original) The apparatus defined in claim 7 and further including cooperating means on the distal ends of said first and second tubes for forming a purse string suture.

10. (Original) The apparatus defined in claim 5 wherein said third sealing means comprise

an umbrella mounted to the outside of the inner tube, said umbrella being moveable between a retracted position wherein the umbrella nests against the inner tube within the outer tube and an extended position wherein the umbrella extends radially out from the inner tube beyond the distal end of the outer tube, and

means for moving the umbrella between its retracted and extended positions.

11. (Original) Apparatus for performing a transesophageal cardiovascular procedure, said apparatus comprising

an elongated flexible tubular shaft having a proximal end, a distal end and a wall extending between said ends;

a first lumen extending along the shaft, said lumen having an open proximal end near the proximal end of the shaft and an open distal end constituted by a side opening in the wall of the shaft near the distal end of the shaft;

first expandable sealing means on the side wall of the shaft and extending above and below said side opening;

expanding means extending along the shaft for expanding said first sealing means so that when the shaft is inserted into a patient's esophagus and the first sealing means are expanded, the portion of the esophagus opposite the side opening is isolated from the remainder of the esophagus above and below the side opening;

a fiber optic endoscope extending along the shaft said endoscope having a proximal end adapted for connection to a light source and a distal end located adjacent to said side opening for viewing the portion of the esophagus opposite the side opening;

an ultrasound transducer in said shaft near the distal end thereof, and

conductors extending along the shaft for connecting the transducer to an ultrasound transceiver.

12. (Original) The apparatus defined in claim 11 wherein the first sealing means comprise at least one inflatable balloon and the expanding means include a first fluid conduit for conducting an inflation fluid to and from said at least one balloon.

13. (Original) The apparatus defined in claim 12 and further including at least one vacuum port in the shaft wall adjacent to said side opening, and

a second conduit extending along the shaft, said second conduit having a proximal end for connection to a vacuum source and being in fluid communication with said at least one vacuum port so that a vacuum can be drawn in the isolated portion of the esophagus.

14. (Original) The apparatus defined in claim 13 and further including additional vacuum ports in the shaft wall spaced above and below said at least one vacuum port, said second conduit also being in fluid communication with said additional vacuum ports.

15. (Original) The apparatus defined in claim 11 and further including a light source connected to the proximal end of the endoscope and an ultrasound transceiver connected to said conductors.

16. (Original) The apparatus defined in claim 11 wherein said first lumen transitions gradually to said side opening.

17. (Original) The apparatus defined in claim 11 and further including an elongated probe or surgical device received in said first lumen said probe or surgical device having a working end which is deployable from said side opening.

18. (New) Apparatus for performing a transesophageal procedure, said apparatus comprising

an elongated tubular access device having a proximal end, a distal end and a wall extending between said ends;

a first lumen extending along the device, said first lumen having an open proximal end and an open distal end constituted by a side opening the wall of the device near the distal end;

expandable sealing means on the outside of said device and extending above and below said side opening, and

expanding means extending along said device for expanding said sealing means so that when the device is inserted into said esophagus and the sealing means are expanded, the portion of the esophagus opposite said side opening is isolated from the remainder of the tract above and below the side opening.

19. (New) The apparatus defined in claim 18 wherein the length of the device is such that said side opening may be located in the esophagus opposite the heart of said patient.

20. (New) The apparatus defined in claim 18 and further including

a second lumen extending along said device, said second lumen having a proximal end for connection to a vacuum source and a distal end which opens adjacent to said side opening so that fluid may be sucked from said isolated portion of the esophagus.

21. (New) The apparatus defined in claim 18 and further including

a second lumen having a rigid outer wall and a collapsible inner wall, said second lumen being adapted to slidably receive an elongated probe or surgical device, and

means for introducing a fluid between said inner and outer walls to collapse the inner wall against the probe or surgical device received in the second lumen.

22. (New) The apparatus defined in claim 18 and further including

perforate fluid channels formed in the outside of said device above and below said side opening, and

conduit means extending along the device for conducting fluid to and/or from said channels.

23. (New) The apparatus defined in claim 18 and further including a side access unit comprising

elongated flexible coaxial inner and outer tubes said tubes having proximal and distal ends and being movable relatively in the axial direction and said inner tube having at least one lumen extending between said ends;

second sealing means mounted to the distal end of the outer tube;

third sealing means mounted to the distal end of the inner tube, and

means adjacent to the proximal ends of said tubes for moving said tubes relatively so as to vary the axial spacing of said second and third sealing means.

24. (New) The apparatus defined in claim 23 wherein the second and third sealing means comprise balloons or flanges.

25. (New) The apparatus defined in claim 23 wherein the second sealing means comprise

a plurality of flexible, axially extending flaps mounted to the distal end of the outer tube, said flaps being movable between a collapsed position wherein the flaps are nested against the outer tube and an extended position wherein the flaps project radially out from the outer tube, and

means for moving the flaps between said collapsed and extended positions.

26. (New) The apparatus defined in claim 25 wherein the moving means comprise

elongated needles extending from the proximal end of the outer tube into said flaps, said needles having segments in said flaps which are offset so that rotation of said needles moves the flaps between said collapsed and extended positions, and

means at said proximal end of the inner tube for rotating said needles.

27. (New) The apparatus defined in claim 25 and further including cooperating means on the distal ends of said first and second tubes for forming a purse string suture.

28. (New) The apparatus defined in claim 23 wherein said third sealing means comprise

an umbrella mounted to the outside of the inner tube, said umbrella being moveable between a retracted position wherein the umbrella nests against the inner tube within the outer tube and an extended position wherein the umbrella extends radially out from the inner tube beyond the distal end of the outer tube, and

means for moving the umbrella between its retracted and extended positions.

29. (New) Apparatus for performing a transesophageal procedure, said apparatus comprising

an elongated flexible tubular shaft having a proximal end, a distal end and a wall extending between said ends;

a first lumen extending along the shaft, said lumen having an open proximal end near the proximal end of the shaft and an open distal end near the distal end of the shaft;

first expandable sealing means on the side wall of the shaft and extending above and below said opening;

expanding means extending along the shaft for expanding said first sealing means so that when the shaft is inserted into said esophagus and the first sealing means are expanded, a portion of the esophagus opposite the opening is isolated from the remainder of the esophagus above and below the opening;

a fiberoptic endoscope extending along the shaft said endoscope having a proximal end adapted for connection to a light source and a distal end located adjacent to said opening for viewing the portion of said esophagus opposite the opening;

an ultrasound transducer in said shaft near the distal end thereof, and

conductors extending along the shaft for connecting the transducer to an ultrasound transceiver.

30. (New) The apparatus defined in claim 29 wherein the first sealing means comprise at least one inflatable balloon and the expanding means include a first fluid conduit for conducting an inflation fluid to and from said at least one balloon.

31. (New) The apparatus defined in claim 30 and further including at least one vacuum port in the shaft wall adjacent to said opening, and

a second conduit extending along the shaft, said second conduit having a proximal end for connection to a vacuum source and being in fluid communication with said at least one vacuum port so that a vacuum can be drawn in the isolated portion of the esophagus.

32. (New) The apparatus defined in claim 31 and further including additional vacuum ports in the shaft wall spaced above and below said at least one vacuum port, said second conduit also being in fluid communication with said additional vacuum ports.

33. (New) The apparatus defined in claim 29 and further including

a light source connected to the proximal end of the endoscope, and

an ultrasound transceiver connected to said conductors.

34. (New) The apparatus defined in claim 29 and further including an elongated probe or surgical device received in said first lumen, said probe or surgical device having a working end which is deployable from said opening.

35. (New) Apparatus for guiding an endoscope or a therapeutic device into a body cavity via the esophagus to conduct an observation or a therapeutic treatment in said body cavity, said apparatus comprising

an insertion section which has a proximal end, a distal end and a central axis extending between said ends and which is capable of being inserted into a body through the mouth, and

a fixing device arranged in the vicinity of the distal end of the guide tube for fixing said distal end to a portion of the esophagus.

36. (New) The apparatus defined in claim 35 wherein the fixing device comprises a pair of flaps which clamp the esophagus portion therebetween.

37. (New) The apparatus defined in claim 36 wherein the fixing device comprises one or more inflatable balloons for engaging the esophagus portion.

38. (New) The apparatus defined in claim 35 and further including a penetration device received in the guide tube, said penetration device having a distal end for projecting through the distal end of the guide tube for penetrating the esophagus portion at a selected penetration site.

39. (New) The guide tube defined in claim 38 wherein the fixing device establishes a seal between the distal end of the penetration device and the esophagus portion around the penetration site.

40. (New) The apparatus defined in claim 38 wherein the penetration device comprises a needle with an overlying dilator sheath.

41. (New) A apparatus according to claim 35 wherein the insertion section has an outer diameter of 5 to 10mm.

42. (New) The guide tube according to claim 35 wherein the insertion section can be bent in at least one direction from said central axis.

43. (New) Apparatus for guiding an endoscope or a therapeutic device into a body cavity via the esophagus to conduct an observation or a therapeutic treatment in the body cavity, said apparatus comprising

an insertion section which has a distal end which is capable of being inserted into the esophagus through the mouth,

wherein the endoscope or therapeutic device has a distal end portion which is flexible so that the endoscope and therapeutic device can be bent.

44. (New) The apparatus according to claim 43 and further including a pair of spaced-apart inflatable balloons arranged in the vicinity of the distal end of the insertion section which balloons may be clamped to opposite sides of the esophageal wall at the penetration site.

45. (New) Apparatus for guiding an endoscope or a therapeutic device into a body cavity via the esophagus, said apparatus comprising

an insertion section which can be inserted into a body through the mouth, the insertion section having a distal end arranged in the body and at least one lumen through which the endoscope or therapeutic device can be inserted;

a proximal end which is connected to the insertion section and is arranged at the outside of the body;

a needle which is moveably attached to the shaft and which has an engaging portion capable of engaging a suture therewith, and

a driving force transmitting member which has one end connected to the needle and the other end arranged at said proximal end,

wherein the distal end is capable of being fixed to a required portion in the body cavity to suture tissue by operating the driving force transmitting member on the outside of the body.

46. (New) Apparatus for performing a transesophageal procedure, said apparatus comprising

an elongated, hollow, flexible tube having an interior passage sized to received and allow the passage of an endoscope, said tube having an open distal end portion;

a pair of spaced-apart inflatable balloon structures defined adjacent said distal end portion of the tube, and

an inflation conduit extending from said first and second balloon structures to respective inflation ports disposed adjacent a proximal end of said tube for selective inflation and deflation of said balloons.